

BUILD A MICHIGAN SLOYD **SPOON MULE**



MICHIGAN SLOYD

DAWSON MOORE

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Measured drawings are available at:
www.michigansloyd.com

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MICHIGAN SLOYD

DAWSON MOORE

Materials

Choosing and milling wood

I choose to build my spoon mules from Southern Yellow Pine (SYP). It is cheap, strong, and readily available. Depending on your location, you may not find it at the box stores, but will probably find it at your local building suppliers.

The ideal board

I start with a 16' long 2 x 12. You could get shorter boards, but the longer ones tend to be straighter and clear of knots. The idea is to pick a board that can be ripped in half to produce two quarter/rift sawn boards. You can have the lumber yard cut your board down to 8' or even 4' long sections if needed to fit in your car.

Break down, sticker, and dry

Construction lumber tends to be on the wet side. I've found it beneficial to break the board down somewhat and sticker the pieces to let them acclimate to my shop for a week or two.

So when you get the lumber home, crosscut it into 4' lengths if not already done. Layout and cut the seat blank from one of the boards. Once this is done, all remaining pieces can be further broken down by ripping them down the middle lengthwise. After ripping in half, rip about a quarter inch off the outer edges to remove the rounded corners. You should end up with the seat and 8 boards roughly 5 $\frac{3}{8}$ " wide, 6 will be 4' long and 2 will be about 3' long. They will look similar to the picture above. Sticker them and set them aside in your shop.

Cut out parts

Once your boards seem dry and stable, you can proceed to cut the rest of the parts. Keep in mind that you may want to leave parts that will be glued up a bit larger than their final dimensions at this stage. These parts include the head and the riser. You will have more material left after glue up to even out slight misalignments.

Reserve the two most straight and flat 4' long boards for the rails. Layout the rest of the parts working around any knots the best you can. In the plans I show an example of the most efficient layout, but keep in mind there will be plenty of extra material to work with.



Base

Legs

Layout and cut legs

You'll need to cut the leg components first to be able to layout the joinery on the rails. All three legs can be cut from one of the 4' long boards. Layout a front leg along one edge of the board. I use templates in the photo, but it is fairly easy to construct a drawing from the plans. What the templates show is how the rear leg is automatically laid out and cut out when cutting one of the front legs. You can either layout both front legs or cut one out and use it as a template for the second leg.



15° angle cut

After all three legs are cut out, cut the 15° angles off the top and bottom of the front legs making sure the cuts run parallel to one another and that the legs are mirror images, not identical. Use a bevel gauge to mark the cut.



Base

Rails | Spacer Block | Flatten the Rails

Rail spacer block

Now is also a good time to cut the center spacer that will go between the rails at the front legs. You will probably be able to use an offcut from the legs for this piece.

I choose not to thickness plane the leg components and center spacer. It is not critical to the function of the mule and keeps the rails spaced apart slightly more than the riser assembly, allowing it to slide more easily into the rails. Feel free to plane the legs for aesthetic reasons if you so choose.



Flatten the rails

It is important that you get your rails straight and flat. I use simple winding sticks and hand planes to remove any twist and smooth things out.



Base

Rails | Layout and Cut Notch

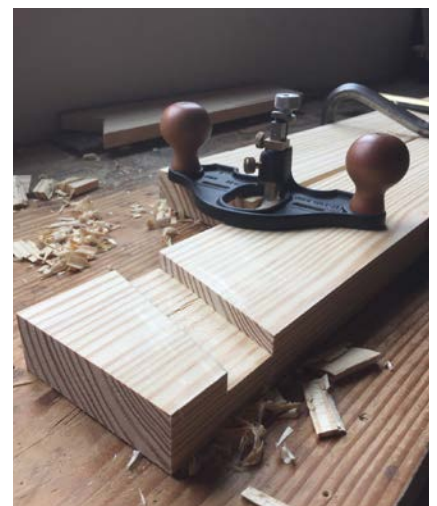
Layout notch for front legs

The next step is to layout the notches that the front legs will be let into. First, mark the inside of each rail noting which is right and left and draw directional arrows pointing to the front and top of the rails. Then layout one side of the notch with a bevel gauge set to 15°.



Cut notch

With one line drawn, you can use the leg itself to accurately mark the other side of the notch. Mark the depth of cut on the top and bottom of the rail with a marking gauge. I saw the sidewalls with a handsaw, chop the bulk of the waste out with a chisel, and clean up with a router plane.

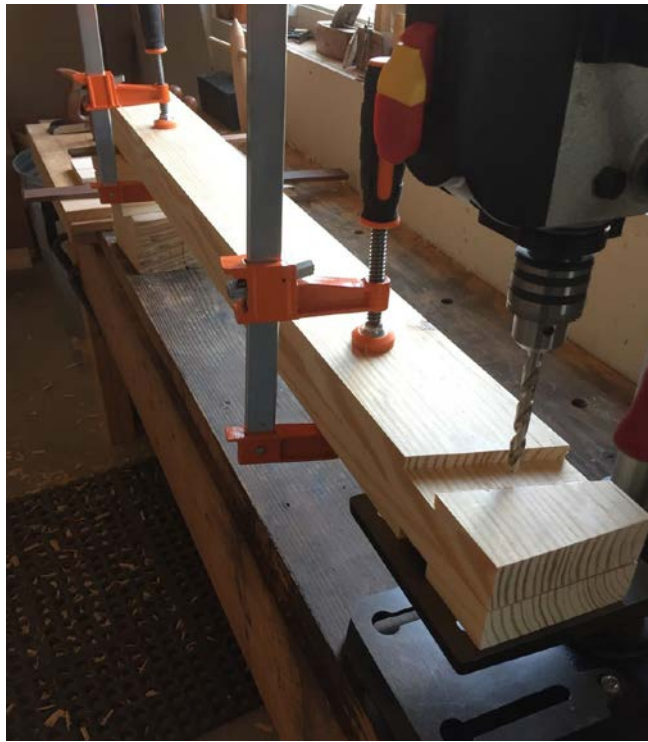


Base

Rails | Bolt Holes for Front Legs

Drill bolt holes for front legs

With both notches cut at the front of the rails, the next step is to drill all the holes for the bolts that will hold the base together and allow it to be easily disassembled. This is one of the trickiest parts of the build and could be done in many different ways. You have to drill straight holes through 5 separate components and get them all lined up to let the bolts slide through without too much effort. I will show a way that works for me using a small drill press and a handheld power drill. The idea is to start straight holes on the drill press and then continue them with the power drill.



I start by clamping the rails together flush. Mark and drill the two holes through these two pieces on the drill press.



With the rails still clamped together, clamp one of the legs into its notch. Leave the leg recessed down in the notch about $\frac{1}{16}$ " from the top of the rails. This makes it easier to plane the rails level after assembly. Make sure the clamp is positioned to allow you to flip the whole rig over.

continued on next page

Base

Rails | Bolt Holes for Front Legs

Drill bolt holes for front legs



Flip the rails and leg over and, using a handheld power drill, drill through one of the holes you began on the drill press.



After drilling one hole through the leg, place another clamp over the hole you just drilled.



Remove the first clamp and drill the second hole. Remove the first leg and then repeat the whole procedure for the other leg. It's a lot of clamping, unclamping, and flipping, but done carefully will result in straight holes.



After both legs are drilled, you can use the same procedure to drill the holes in the center spacer. The spacer will benefit from reaming the holes a bit by running the drill at a tilt with a side to side and circular motion.

Base

Rails | Bolt Holes for Rear Leg



Drill bolt holes for rear leg in one rail

Unclamp the rails and take one to the drill press and drill the two holes for the rear leg. These holes will be a sufficient pilots to continue the hole through the rear leg and second rail.



Assemble base

Begin assembling the base on the floor. I find it easiest to do with the base turned upside down. You may need a mallet to tap the bolts through all the front leg components.

Drill bolt holes through rails and rear leg

Once the front legs are bolted, flip the base right side up. Position the rear leg between the two rails and put a clamp over one of the predrilled holes. I make sure the rails are about $\frac{1}{16}$ " proud of the leg to make planing the top of the rails easier. Now, continue the predrilled holes in one rail through the whole assembly. I drill one hole through, and bolt it up tightly. Then remove the clamp and complete the second hole.

With the base fully assembled, plane the top of the rails so they are flat and even with one another. This will ensure a solid fit between rails and riser and a seat with little wobble.



Seat

Assembly and shaping

Assembly

The seat assembly is pretty straight forward. Mark the screw locations on the top of the seat. Mark a centerline for the fin on the bottom of the seat. Clamp the fin to the seat and drive one of the screws in. Unclamp and check that the fin is square to the seat. Reclamp the fin and drive the second screw in.

Chamfer the sharp edges

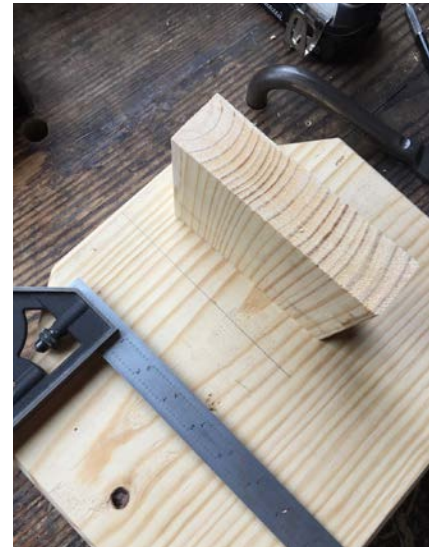
I chamfer all the sharp edges on the seat and the bottom edges of the fin to make it a bit easier to slide into the rails.

Fin options

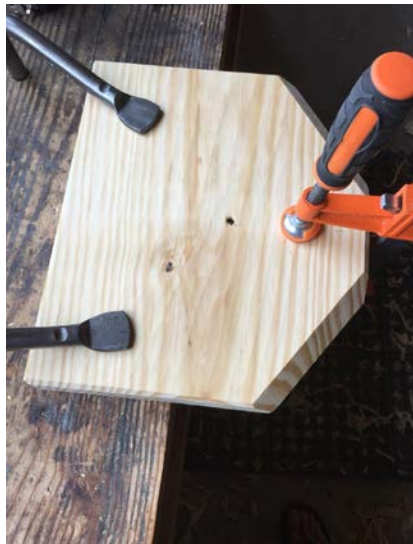
You may choose to make a longer fin to create a wedged through tenon to hold the seat more firmly to the rails, similar to the riser assembly. I have found it unnecessary. As long as you don't plane the seat fin, it should make a fairly tight friction fit between the rails.



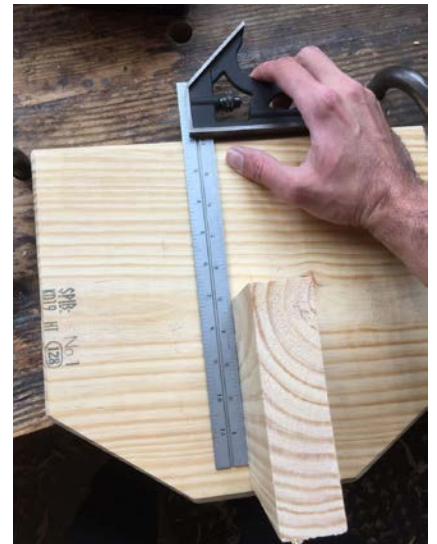
Mark screw locations



Mark centerline on bottom



Clamp fin on seat and drive in one screw



Unclamp and check that the fin is square to the seat. Drive the second screw in.

Assemble center and side laminations

Next up is the riser assembly. This is another area you want to get all the components very flat and smooth with no gaps at the glue joint. While planing the center piece, also test the fit in the base. It should slide easily between the rails. As noted earlier, I leave my glue up components oversize so that I can even out any misalignments that occur during glue up. Mark the pieces to keep track of proper assembly and to indicate the final dimensions. Glue the two short side pieces to the longer center piece. After glue up, I trim the shoulders square on a crosscut sled at the table saw and then clean them up with a shoulder plane. I then plane the long faces of the glue joints to clean them up.

Test fit

Test fit the riser to the base rails. If there is any wobble or gaps, correct the issue by either flattening the rails and/or tuning the riser shoulders. When you have a good fit, make a pencil mark on both sides of the riser along the bottom of the rails.



Mark pieces to keep track of proper assembly and to indicate the final dimensions.



After glue up, trim the shoulders square on a crosscut sled at the table saw and then clean them up with a shoulder plane.



Make a pencil mark on both sides of the riser along the bottom of the rails.

Riser

Wedge

Drill mortise. Clamp the riser to your work-bench and mark the location of the mortise. Make sure a small portion of the mortise crosses the line you made from the bottom of the rails.

Make a wedge. Before chopping the rest of the mortise, make a wedge with about 6 degrees of taper. I use the wedge itself as a guide for my chisel to create the proper angle to match the mortise to the wedge.

Check fit. As you progress through chopping out the mortise, insert the wedge several times to check the fit as you go. Ideally, the wedge will seat nicely on the bottom of the mortise with no visible gaps showing between mortise bottom and wedge on both sides of the tenon. This can be a tricky process, but is worth getting a good fit. A mismatched fit can lead to mortise wall blowouts or a loose fitting riser.

Test riser and wedge in base. When the wedge has a nice fit, you can test it out in your base. You may need to plane your wedge or trim off either end to get the amount of exposed wedge you want on either side of the riser when installed. You want at least about ½" to 1" sticking out either side of the rails when it is fully seated.



Drill mortise just above line from bottom of rails



Make a wedge with 6° of taper



Use the wedge as a guide for proper chisel angle



Check the fit as you go



Test the riser assembly and wedge in the base

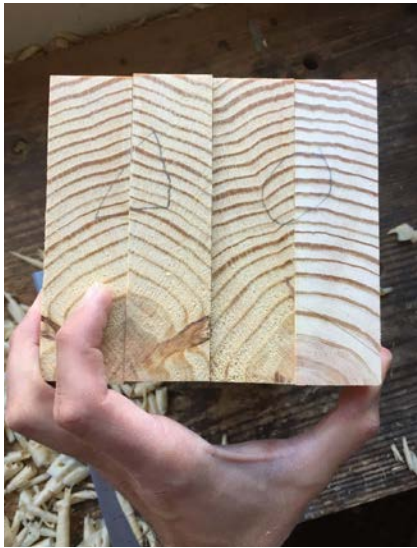
Head

Glue up Laminations | Cut Notch

Glue up oversize laminations

I begin the head construction with four oversized laminations. Orient them so that any imperfections will be located in the areas that will be cut out to give the head its final shape. I tend to bookmatch two pairs with the pith oriented toward the bottom of the head. Mark each pair with different marks to note which parts get glued together. They need to be flattened so they stack side by side with no gaps in preparation for glue up.

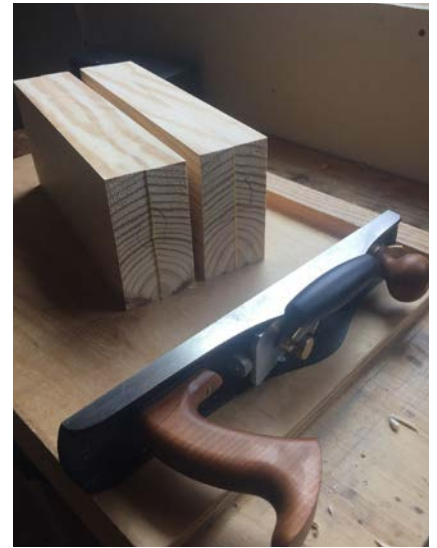
After the glue dries, clean up the tops and bottoms of the laminations with a plane and trim the ends to final length on the table saw. Be sure you redo your marks after trimming them away. They are needed to orient the laminations front to back, top to bottom, and left and right.



Mark each pair with different marks

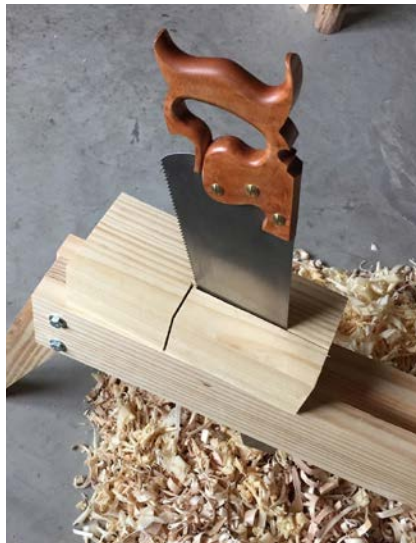


Prior to glue-up flatten so they stack side by side with no gaps



Clean up and trim to length

Lay out and cut the bottom notches



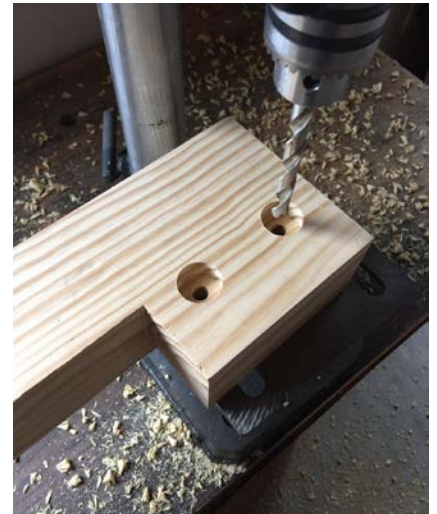
Head

Drill Bolt Holes

All the holes in the head will be drilled at this point.

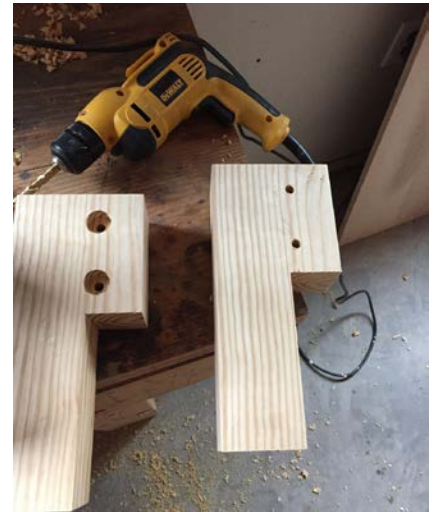
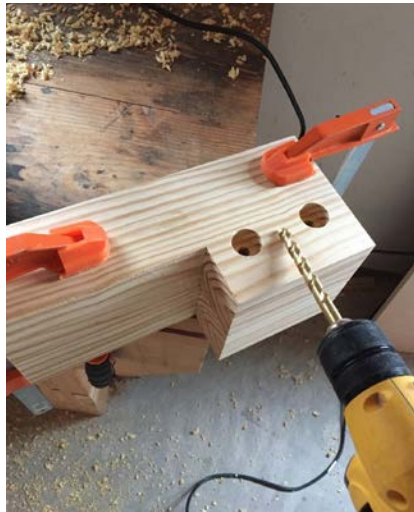
Drill first lamination

Start with one of the laminations by marking and drilling the counter sinks for the two bolt holes. Switch drill bits and continue drilling for the bolts.



Add second lamination

Align the two laminations, clamp together, and continue drilling using the holes from the drill press as a guide. Unclamp and continue the holes through the second lamination.



Drill counter sinks in second lamination

Take the second lamination to the drill press and drill the counter sinks centered over the drilled bolt holes.



Drill hole for toggle wire

Now mark and drill the holes for the wire on both laminations. These holes don't have to necessarily penetrate the entire lamination at this point. As long as they are a little over an inch deep, they will be exposed when cutting the mortise for the jaws.

Head

Spacer Blocks | Jaw Mortise

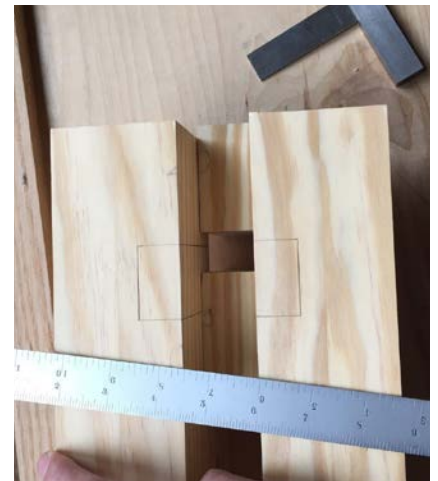
Cut spacer blocks

Cut the two spacer blocks that will complete the head lamination. Their length should be precise, their height can be slightly oversized and planed flush after glue up. Flatten the blocks ganged together as shown and take your time checking the fit between the blocks and side laminations.



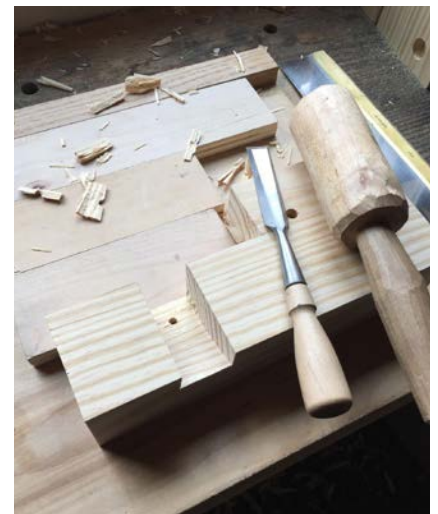
Layout jaw mortise

Layout half the jaw mortise on each lamination. Use the spacer blocks to determine the final mortise width on the top and bottom of the head.



Cut jaw mortise

I cut the side walls with a crosscut saw and chop and pare the waste with a chisel. Note the wire holes become exposed after removing the waste.



Head

Final Glue-up

Test fit head components

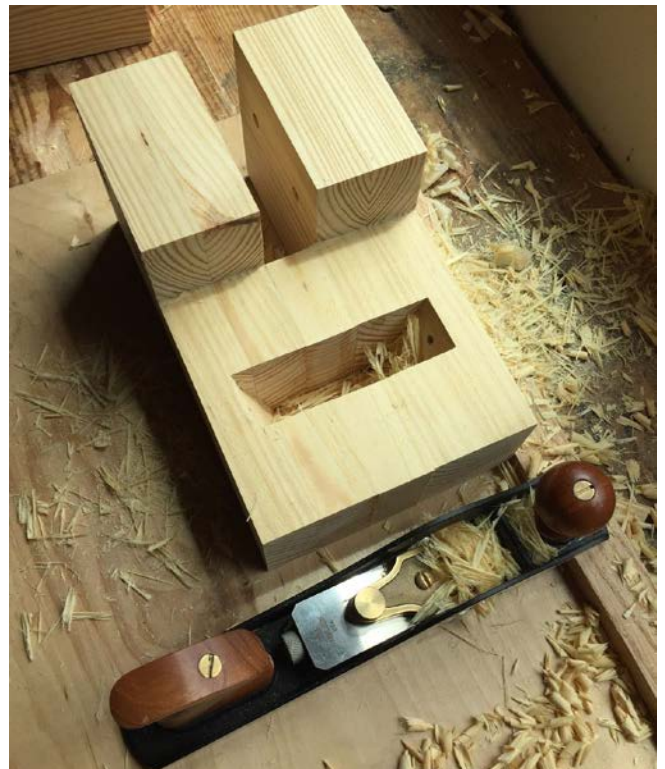
With the bolts temporarily in place, check that the spacer blocks line up properly with the mortise before final glue up.



Glue up head

This can be a stressful glue up trying to get everything aligned properly. I usually do it all in one go, using the bolts again to get the components aligned. Alternately, you could glue the spacers to one side lamination, let dry and then glue the two remaining laminations together, again using the bolts to help with alignment.

Once dry, use a chisel to remove all the glue squeeze out from the jaw mortise and the mortise that will accept the riser tenon. Plane the bottom and top of the head to flatten and remove glue. I just go across the grain with a large rebate plane on the bottom. This area does not need a fine finish. You can run the front face of the head through the table saw to lightly remove glue and make flush.



Head

Install on riser

Check fit of head to riser tenon

Now you can check the fit of the head to the riser tenon. If the head mortise won't slide onto the tenon, plane the tenon until they go together. Next, check the fit of the bottom of the head to the shoulders of the tenon. Make adjustments if necessary by planing the bottom of the head.



Install with bolts and tee nuts

When you have a good fit, hold the head firmly in place, using clamps if necessary, and continue drilling the bolt holes through the riser tenon from both sides of the head. Rotate the drill at a tilted angle to ream the bolt holes a bit wider on one side of the head so that the tee nuts will have a little room to begin getting pulled into their final position.

Lightly tap the tee nuts into the reamed bolt holes using a peg and mallet. Insert the bolts with washers from the other side of the head and tighten. It can be a little tricky to get the bolt to engage the tee nut at first. You can check the alignment of the bolt coming through the head and give the tee nut light taps on its perimeter to center the nut opening over the bolt.



Jaws

Mill, mortise, and shape



Cut to width and length

Cut the two jaws to width and length. Before shaping, mark the location of the hole the wire will pass through.



Layout

Then turn the jaw on its side and mark the three points on the top and each side. Connect the points with two lines to create the profile of the jaw.



Drill for wire toggle

Cut the profile and then drill the hole through the jaw. An easy way to get the hole properly aligned is to hold the cut face of the jaw firmly to the table on a drill press.



Cut notch

Once the hole is drilled, cut out the small relief that will accept the leather jaw liner.



Shape

The last step in shaping the jaws is to heavily chamfer all four edges. This could be done at the shave horse, carved with a knife, or simply run through a table saw with the blade at 45°

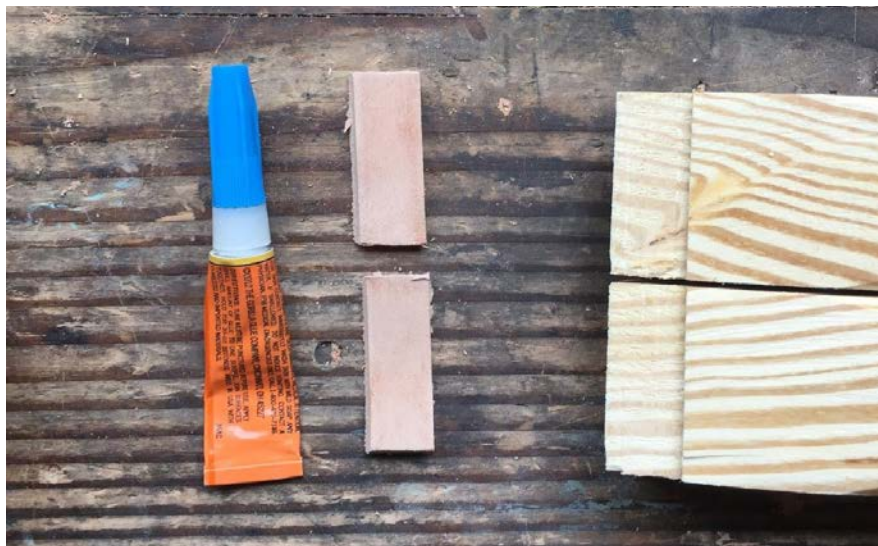
Jaws

Leather pads

Cut out leather pads

Cut some small pieces of leather to match the reliefs cut at the end of the jaws. It should be at least 1/8" thick and as hard as possible. Sand both sides with very coarse sand paper.

The skin side will be glued into the notch. It is helpful to score the other side in a diagonal crisscross pattern similar to the soles of deck shoes. Try to make the cuts about half the depth of the leather.



Glue pads to jaws

Use super glue to hold the leather jaw liners in place. I just repeatedly press the liners into the jaws with thumb pressure for a few minutes rather than using some elaborate clamping setup.

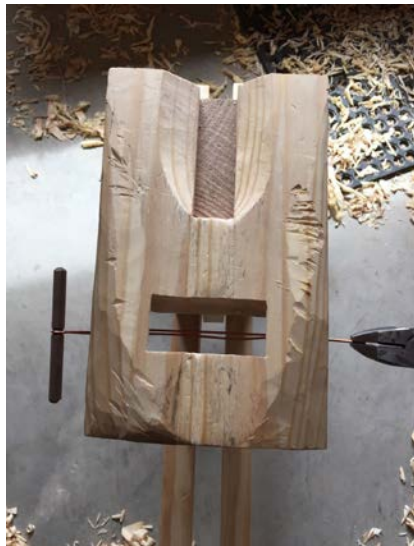
Jaws

Spacer and toggle

Shape toggle and spacer

Use some small scrap material to cut out the pieces for the jaw spacer insert and the toggle for the wire. I use walnut just because I have a bunch of small scraps and it stands out amongst all the blonde wood I use, making them a bit easier to find with the eye.

Use a block plane and/or carving knife to shape the parts. I cut the notch in the spacer insert on my crosscut sled at the table saw.



Crimp and twist wire for toggle

Use some heavy pliers to crimp the wire around the notch in the toggle. Insert the wire through the mule head to help stabilize while twisting. While holding the ends of the wire firmly with the pliers rotate the toggle to create the two ply twist. Remove the wire and trim the end to tidy up.

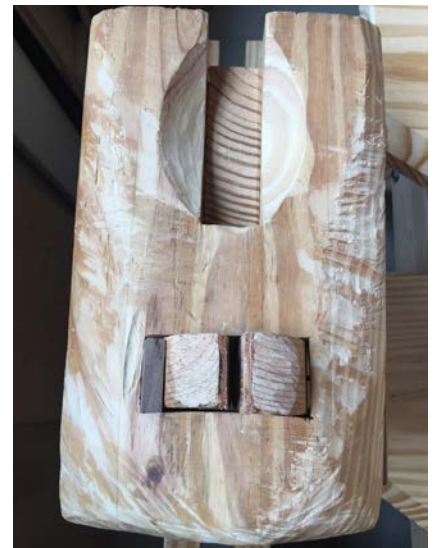
Head

Install jaws | Shape head

Install toggle in head and jaws

Insert the jaws into head from the bottom and guide the wire all the way through the head and jaws. Simply bend the end of the wire under the head to secure.

The jaws spacer insert can be dropped into the jaw mortise along the outside of one of the jaws to reduce the distance the jaws open.



Carve head

You can carve the head to suit your needs at this point or let the shape take place naturally as you hit certain areas with your drawknife while carving. The head should not be thought of as precious. The pictures and plans show how I carve my heads to begin with, but they change over time with use. Carving out the notch above the tenon riser gives a bit more clearance space for the bowls of large spoons and ladles.

An old, well used head

Ways to experiment

Wire gauge | Jaws

The plans for this spoon mule result in a setup that allows me to carve my entire line of production spoons and cooking utensils. Everything from chopsticks, spoons, and spatulas, to large ladles. It also comes in handy when carving my hewn bowls. What works for me might not necessarily work for everyone, so I'll describe some ways to experiment with the mule's setup to fit different needs.

Wire gauge

Different wire gauges will affect the action of the jaws (movement up and down and ability to move both jaws with one hand). You could try a single wire instead of a two ply twist. Try a coat hanger maybe. This is a very quick and easy way to try out different feels for how the mule works.

Hole position in jaws

You can drill additional holes above or below the hole through the jaws to affect the amount of jaw exposed above the head.

Jaw spacer insert

You can make different thickness spacers to vary the width the jaws open. Just use the original spacer as a template.

Jaw shape

The jaws can be shaped in many different ways to suit different needs. The simplest variation is to carve away material from the back of each jaw where they pass through the mule head. This will create a larger opening between the jaws. Different shapes can also be carved into the face of the jaws to fit specific projects. For example, I have a pair with a curved talon profile to grip around the handle of kuksas. The basic jaw dimensions were designed to be easily obtained by ripping a 2x4 in half at the table saw. This ensures quick, cheap, and easy access to experimentation. One set of jaws can even have different profiles carved at each end and reversed when needed.



Ways to experiment

Bowls and Kuksas



Bowls and kuksas

The flat surface on the bottom of the mule head allows work to be clamped to the head using J-clamps and a scrap of wood. You can use different blocking setups and/or a moving blanket to support and pad the work piece. As noted above, special jaws can be made to hold kuksa handles. The entire riser and head can be flipped within the rails to keep the kuksa fully supported while working on both ends of the workpiece.